More Algebra:

Variable:	Equation:
t_i	$F(t_f - t_i) = m(v_f - v_i)$
d_i	$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$

for t_i

$$F(t_f - t_i) = m(v_f - v_i)$$

$$t_f - t_i = \frac{m(v_f - v_i)}{F}$$

$$t_i = t_f - \frac{m(v_f - v_i)}{F}$$

$$= \frac{m(v_f - v_i) - F t_f}{-F}$$

for d_i

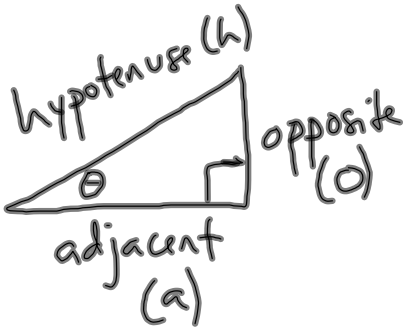
$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o}$$

$$d_i = \left[\frac{1}{f} - \frac{1}{d_o}\right]^{-1}$$

$$= \frac{1}{\frac{1}{f} - \frac{1}{d_o}}$$

Right Triangles:



θ = Greek letter → stands for angle

Sine → relates angle, opposite side, and hypotenuse

$$\sin\theta = \frac{o}{h}$$

$\sin(0°) = 0$

$\sin(90°) = 1$

Cosine → relates angle, adjacent side, and hypotenuse

$$\cos\theta = \frac{a}{h}$$

$\cos(0°) = 1$

$\cos(90°) = 0$

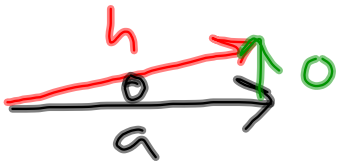
Tangent → relates angle, opposite side, and adjacent side

$$\tan\theta = \frac{o}{a}$$

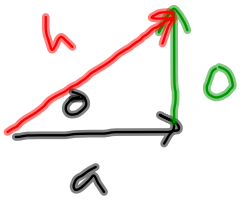
$\tan(0°) = 0$

$\tan(90°) =$ undefined

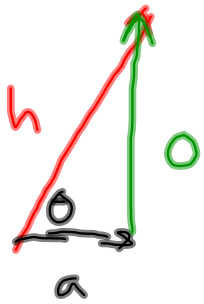
SOHCAHTOA



at 10°



at 45°



at 80°

at 90° a does not exist

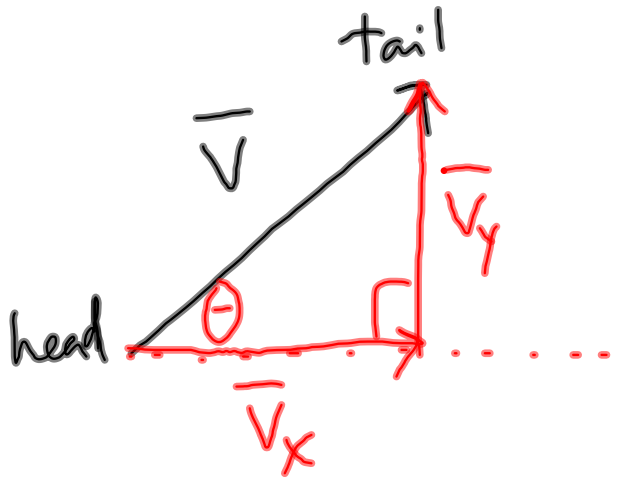
Vectors and Scalars:

- Vector → quantity that has both a magnitude and direction
- Scalar → quantity that just has magnitude
- Examples:

Vectors	Scalars
velocity	speed
force	distance
acceleration	Volume
momentum	mass
	density
	time

- The meaning of +/-
  - Vectors → we have to define a positive direction, so +/- meas a direction
  - Scalars → +/- is an increase or decrease

Vectors:



$$\sin\theta = \frac{|\bar{V}_y|}{|\bar{V}|}$$

$$\cos\theta = \frac{|\bar{V}_x|}{|\bar{V}|}$$

$$\tan\theta = \frac{|\bar{V}_y|}{|\bar{V}_x|}$$

$|\bar{V}| = V$

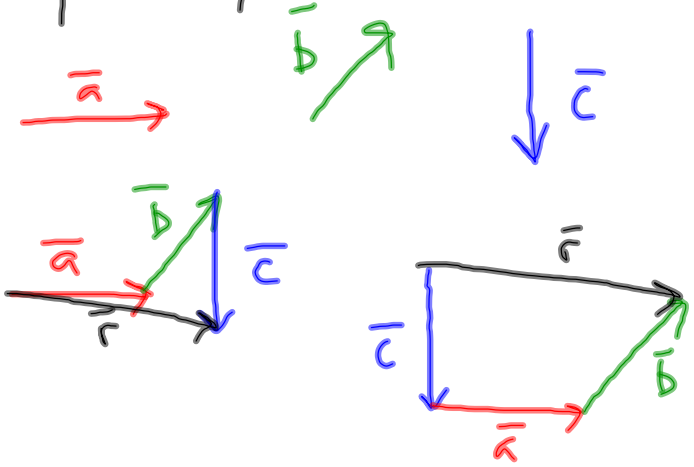
$|\bar{V}|$: vector

V: just magnitude

– all parts of triangle MUST be the same quantity

Adding Vectors:

- Graphically:



- Steps:

1. Move vectors so that head of next vector touches the tail of previous vector

(During this, only slide. Do not rotate or change length.)

2. Resultant vector goes from the head of first vector to tail of last vector.

3. Order of addition doesn't matte

Practice: